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Title of the invention

Connectable bucket tappet

Description

Field of the invention

The invention relates to a connectable bucket tappet for a valve drive of an internal combustion engine, having a ring shaped section which has a skirt for oscillatory mounting in a holder of an internal combustion engine and, in its bore, accommodates a circular section such that it can move axially, it being possible for the two sections to be coupled to each other in at least one axial displacement position in relation to each other via at least one slider which can be displaced radially or in the manner of a secant and which runs in the circular section in the uncoupled state, holders for the slider being provided in the region of bases of the sections and an outer surface of the circular section being enclosed by at least one compression spring which, at one end, acts against the base of the ring shaped section and, and the other end, acts against a support of the circular section which is remote from the base.

Background of the invention

A bucket tappet of this type is previously known from US 5,651,335. In this, two sliders are arranged in the vicinity of the base of the circular section and, for the coupling case, can be displaced radially outward into a corresponding holder of a ring shaped section. The disadvantage in the case of the generic tappet is that, in particular, its ring shaped section is relatively complicated to produce. This is based on the fact that its holders are connected thereto in one piece. The relatively massive transverse web present in the ring shaped section in order to form the holders makes fabrication, in particular chip-free fabrication, of the ring shaped section relatively expensive. Furthermore, it must be recorded that only a relatively short compression spring can be used as a lost-motion spring because of the transverse webs.

Object of the invention

It is therefore an object of the invention to provide a connectable tappet of the aforementioned type in which the cited disadvantages are eliminated with simple means.

Summary of the invention

According to the invention, this object is achieved by the holder of the ring shaped section being formed as a separate, sleeve-like component, which extends only over a small part of an annular width of the ring shaped section and

runs with its inner edge immediately in front of the outer surface of the circular section, the component being enclosed at least sectionally by the compression spring radially on the outside and in the axial direction of the bucket tappet.

By means of these aforementioned simple measures, it is possible to dispense with the transverse web disadvantageously present in the prior art. Thus, production of the ring shaped section of the tappet is considerably less complicated and therefore cheaper than hitherto in the prior art. At the same time, the installation space for the compression spring as a lost-motion spring is increased, as a result of which, if necessary, the tappet height can be reduced or a greater relative stroke of the sections in relation to one another can be produced. Precisely as a result of these measures according to the invention, relatively simple chip-free fabrication for the ring shaped section is suggested. Although, like the subject of a further subclaim, radial webs on the base side in the ring shaped section are not dispensed with completely, these are formed merely like weak ribs and are used to support an annular part of the compression spring as a lost-motion spring and, if appropriate, as a subdivision for two separate hydraulic fluid chambers.

Preferably, the intention is to apply only one slider arranged in the circular section. However, two sliders are also conceivable, which can be displaced radially outward for a coupling purpose. In this case, two diametrically opposite,

sleeve-like components then have to be applied in the ring shaped section.

Thought is given in particular to a piston or pin as slider. However, a large number of further coupling elements, such as pawls, balls, wedges and the like, are also conceivable.

The sleeve-like component has only a low depth and is preferably produced from a sheet metal material. Here, a simple deep-drawing method is suggested for its production. If appropriate, a plastic or other lightweight component can also be used.

The sleeve-like component has at least one vent opening, which will not be explained in more detail, or a vent duct, in order to avoid the undesired build-up of an air cushion during the coupling operation.

According to a further subclaim, the annular extension from the inner edge of the base of the ring shaped section is used firstly for excellent guidance of the circular in the ring shaped section. Secondly, it has a radial opening for the simple fixing of the sleeve-like component.

Furthermore, it is the subject of a subclaim to produce a simple antirotation safeguard for the sections in relation to one another by an inner edge of the sleeve-like component, which communicates with a flat on the outer surface of the circular section. Of course, those skilled in the art will discover still further antirotation measures of a form-fitting type.

The fact that the slider is loaded in a displacement direction, preferably in the coupling direction, via at least one helical spring enclosing the latter, means that the holder for the slider in the circular section needs have only a relatively short length. Otherwise, the helical spring would have to be applied to the end of the slider. However, it is also conceivable to load the slider in the coupling direction via compression spring force and to displace it in the uncoupling direction via hydraulic means. If appropriate, other displacement means such as electromagnetic, magnetic and the like can also be used.

The radial webs originating from the base of the ring shaped section are used, as mentioned, for the contact of an annular part. Thus, two segment-like spaces for hydraulic fluid can be implemented, at least one chamber being used for the feed line of the hydraulic fluid in front of one end of the slider. The further chamber can be connected hydraulically to the first-named chamber. However, it can also be used as a supply chamber for the supply of an optionally applied hydraulic play compensating element in the circular section. If appropriate, the slider or the hydraulic element can be supplied virtually directly with hydraulic fluid from the cylinder head via a bore in the skirt.

Brief description of the drawing

The invention is expediently explained in more detail using the drawing. Figures 1, 2 show the bucket tappet according to the invention in longitudinal sections offset through 90° with respect to each other.

Detailed description of the drawing

The two figures disclose a connectable bucket tappet 1 as known per se in the specialist world. The bucket tappet 1 comprises a ring shaped section 2 which, in its bore 3, accommodates a circular section 5 with its outer surface 4 such that it can move axially. The two sections 2, 5 each have a base 6, 7 for a cam contact. In this case, the base 6 is loaded by a cam with a greater stroke than the base 7. Furthermore, the ring shaped section 2 has a skirt 8, via which the bucket tappet 1 can be mounted in a holder of a cylinder head of an internal combustion engine, not shown.

The circular section 5 has, in the vicinity of its base 7, a holder 9 running radially here for a piston-like slider 10. The slider 10 is sectionally enclosed by a helical spring 11. The latter is used to displace the slider 10 in the uncoupling direction. A holder 13 lies opposite one end 12 of the slider 10 in the region of the base 6 of the ring shaped section 2 during a basic circular pass of the cam. Said holder is produced as a sleeve-like component 14 and has an only relatively low depth. The component 14, produced of deep-drawn sheet metal, for example, runs in an annular

extension 15 which extends from an inner edge 16 of the base 6 of the ring shaped section 2 in the direction away from the base.

As shown in figure 2, two diametrically opposite radial webs 16a, 16b originate from the base 6 of the ring shaped section 2. These are used firstly to stiffen the entire ring shaped section 2 and secondly for the contact of an annular part 17, of funnel-like geometry here. On this annular part 17, at one end there bears a compression spring 18 which, at the other end, is mounted on a support 19 connected to the circular section 5. The compression spring 18 is also designated a lost-motion spring.

Furthermore, figure 1 reveals that, between the base 6 and the annular part 17, chambers 20, 21 like circular segments subdivided by the radial webs 16 are formed. In any case, the chamber 20 is used as a supply chamber for hydraulic fluid for displacing the slider 10 in the coupling direction, that is to say sectionally into the sleeve-like component 14. The chamber 21 can be connected hydraulically to the chamber 20, but it can also be used as a supply chamber for supplying a hydraulic play compensating element 22 arranged in the circular section 5.

The outer surface 4 of the circular section 5 has a flat 24 in the peripheral region of an inner edge 23 of the component 14. This provides a simple antirotation safeguard of the ring shaped with respect to the circular section 2, 5.

Figure 1 also discloses that a surface section 25 of the component 14, on the side of the base, jointly with an overhang 26 engaging over said component and belonging to the circular section 5, forms an axial stop for the ring shaped with respect to the circular section 2, 5.

Only one central slider 10 in the circular section 5 is illustrated. Located opposite the latter is the thin-walled component 14, provided with only a very low depth, in the ring shaped section 2. On the basis of this design, it is possible to dispense with the holder for the slider or the sliders previously to be recorded in the prior art and connected in a complicated manner in one piece to the ring shaped section 2. Thus, the production operation for the ring shaped section 2 is relatively simple and economical, just using the chip-free method. Furthermore, it can be seen that, as a result of the low depth of the component 14, this is surrounded sectionally by the compression spring 18.

Thus, a greater compression spring length can be implemented or, as described in more detail in the introduction to the description, the total height of the connectable bucket tappet 1 can be shortened.

List of designations

1	Bucket tappet
2	Ring shaped section
3	Bore
4	Outer surface
5	Circular section
6	Base
7	Base
8	Skirt
9	Holder
10	Slider
11	Helical spring
12	End
13	Holder
14	Component
15	Annular extension
16	Inner edge
16a	Radial web
16b	Radial web
17	Annular part
18	Compression spring
19	Support
20	Chamber
21	Chamber
22	Hydraulic play compensating element
23	Inner edge
24	Flat

25 Surface section

26 Overhang